

Syllabus

EEE 537—Semiconductor Optoelectronics

2006 Catalog Data: EEE 537: Semiconductor Optoelectronics
Electronic states in bulk semiconductors and semiconductor quantum wells, quantum theory of radiation, absorption processes, radiative processes, nonradiative processes, photoluminescence, and optoelectronic devices.
Prerequisites: EEE 434; and 436 or 531 or equivalent.

Text books:

1. “*Optoelectronics: An introduction to materials and devices*”, J. Singh, McGraw-Hill
2. Optional supplement: “*Optical Processes in Semiconductor*”, J. I. Pankove, Dover, 1975.

Instructor: Dr. Yong-Hang Zhang, Professor, Electrical Engineering Dept.

Goals: This course is designed to provide junior graduate students background in the optical properties of semiconductors and semiconductor heterostructures and superlattices. Applications of these properties will also be discussed.

Prerequisites by topics:

1. Basic quantum mechanics and solid state physics
2. Basic concepts of semiconductor devices

Topics:

1. Introduction
2. Materials for Optoelectronics: Structural Properties
3. Light propagation in media
4. Light propagation in waveguide
5. Electronic properties of semiconductors
6. Transport and optical properties of semiconductors
7. Characterization of semiconductor optical properties
8. Light detection and imaging
9. The light emitting diodes
10. The laser diodes
11. Modulator and display devices
12. Optical communication system and devices needs
13. Fabrication and processing of devices

Exams: There will be 2 midterm exams plus a final. All the exams will be open book.

Project: A project will be assigned and a final report is due before the end of the semester.

Lab tour: There will be a lab tour to the MBE Optoelectronics Group.